Physical Medicine and Rehabilitation

I. Temperature modalities

A. Heat

1. Understand that heat therapies and electrotherapies are usually administered in conjunction with other treatments (e.g., exercise, manual therapy).
2. Know that heat and cold are both useful in reducing pain and spasm of musculoskeletal and neurological pathologies (Lehmann and deLateur 1999; Cameron 2003).
3. Be aware of evidence that superficial heating of skin produces muscle relaxation due to decreased gamma-fiber activity and results in decreased spindle excitability, thus decreasing pain and spasm (Lehmann and deLateur 1999).

B. Cold

1. Know that cold reduces pain, bleeding, and swelling due to vasodilatation, which helps in healing and hematoma resolution and is an effective first-aid treatment post-injury when combined with rest, compression, and elevation (Dandy and Edwards 1999; Lehmann and deLateur 1999; Linchitz and Sorrell 2003).
2. Know that ethyl chloride spray and ice massage are counterirritants that have been used in the treatment of myofascial pain (Travell and Simons 1998).
3. Know that heat and cold can raise pain threshold significantly; ice therapy is more effective than heat (Lehmann and deLateur 1999; Cameron 2003).

C. Practical use

1. Know that heat is contraindicated in acute rheumatoid arthritis and in acute trauma, as it may increase bleeding tendency and edema (Lehmann and deLateur 1999).
2. Be aware that local temperature elevation produces many responses: increase in blood flow, increased extensibility of collagen tissues, increased capillary permeability, and enzymatic activity (Lehmann and deLateur 1999).
3. Know that short-wave diathermy is a high-frequency electro-magnetic current operating at frequencies of between 13 and 27.12 MHz that is converted into heat (Draper et al. 1999).
4. Microwave diathermy is a device that applies to specific areas of the body, electromagnetic energy in the microwave frequency bands of 915 MHz to 2,450 MHz. Be aware that short-wave diathermy and microwave diathermy selectively heat muscle (Cameron 2003).
5. Locally applied thermal treatments (ice and heat packs) are commonly used in painful conditions and can be easily applied by the patient at home. There is no evidence to demonstrate that treatment by a practitioner is better than treatment by patients themselves (Robinson et al. 2003).
6. Know that superficial heat includes hot packs, heating pads, paraffin wax, fluidotherapy, hydrotherapy, and radiant heat (heat lamps). Superficial heat produces heating of only the superficial tissues up to 0.5 cm from the surface of the skin, whereas deep heating modalities heat to the depth of 3–5 cm (Linchitz and Sorrell 2003).
7. Know that in ice massage a block of ice is rubbed over the skin surface. The initial phase of cooling is followed by analgesia (Linchitz and Sorrell 2003).
8. Know that temperature modalities should rarely be used alone, but rather in conjunction with appropriate exercises, such as stretching, for increasing range of motion and for strengthening (Watson 2000; Linchitz and Sorrell 2003).
9. Heating modalities should not be used for patients with impaired consciousness, over anesthetized areas, or where circulation is decreased (Lehmann and deLatour 1999). Deep heating modalities should not be used over active malignancies, over gonads, or over a developing fetus (Lehmann and deLatour 1999; Lerman 2001).
10. Know that thermal electrotherapy modalities are contraindicated in the presence of metal implants and cardiac pacemakers. Short-wave diathermy should not be used if either the patient or operator might be pregnant (Lerman et al. 2001).

D. Ultrasound
1. Ultrasound is produced from electromagnetic energy with a frequency of 0.5 to 3.5 MHz, which is converted by a transducer to mechanical energy with similar frequency and intensity of up to 3 W/cm² (Ebenbichler and Resch 1994).
2. Pulsed or continuous ultrasound increases cell permeability by setting up cavitation; stable cavitation reduces the nerve conduction velocity of C fibers, thus decreasing pain (Casimiro et al. 2002).
3. Ultrasound is most commonly used in the treatment of acute tendonitis and calcific tendonitis (Lehman and de Latour 1999; Robertson and Baker 2001).
4. Ultrasound is commonly used in the management of musculoskeletal pain. The therapeutic effects of ultrasound are presumed to come from its thermal effects. The evidence for the efficacy for ultrasound in the management of musculoskeletal pain conditions remains weak (Van der Windt et al. 1999; Robertson and Baker 2001; Wright and Sluka 2001).
5. Ultrasound is effective for the treatment of pain and improvement of range of motion in rheumatoid disease of the hands (Casimiro et al. 2003).
6. Ultrasound is contraindicated over areas containing fluid such as the eyes over amniotic fluid in pregnant women and over joints with active effusion (Lehmann and deLateur 1999).

II. Manipulation mobilization, massage, and traction
A. Manipulation mobilization
1. Be aware that massage, manipulation, and mobilization are widely used for treating pain problems, especially spinal pain (Battie et al. 1994; Haldemann and Hooper 1999; Gracey et al. 2002).
2. Know that peripheral joint mobilization and manipulation are frequently used to treat pain (Jette and Delitto 1997; Broome 2000).
3. Understand that manipulation, massage, and mobilization are rarely applied in isolation, but are often used in combination with education and exercise therapy (Grieve 1994; Gracey et al. 2002).
4. Know the difference between joint mobilization and manipulation.
   a. Spinal adjustment or manipulation involves small-amplitude and high-velocity thrusts; the exact physiological effect of this action is still unknown, but it is hypothesized that correction of dysfunctions leads to improved biomechanical function (Grieve 1994; Haldemann and Hooper 1999; Broome 2000).
   b. Mobilization includes those procedures in which a therapist uses hands and fingers to handle tissues. The mobilization is used to increase range of motion beyond the resistance that limits passive range of motion or exercise. Mobilization differs from manipulation or adjustment in that there is no forceful thrust (Grieve 1994; Haldeman and Hooper 1999).
5. Be aware that there is evidence that manipulation reduces pain in acute and chronic spinal conditions but that the long-term effectiveness and advantage over other established treatments is less clear. There is conflicting evidence on the efficacy of manipulation for the management of disability and long-term work loss (Hoving et al. 2002; Assendelft et al. 2003).
B. Massage

1. Be aware that massage is the application of touch or force to soft tissues, usually muscles, tendons, or ligaments, without causing movement or change of joint position (De Domenico and Wood 1997; Clay and Pounds 2002).
2. Know that massage includes several types and techniques, but the relative effectiveness of each of these is not established; massage focusing on specific points (acupoints) may be more effective than traditional Swedish massage techniques (De Domenico and Wood 1997; Furlan et al. 2002).
3. Be aware that there is evidence that massage is effective in the treatment of subacute and chronic spinal pain, especially if combined with exercises and education (Furlan et al. 2002).
4. Understand that deep friction massage therapy is commonly used to treat tendonitis and epicondylitis (Brosseau et al. 2002) and involves firm and sustained manipulation of the tissues over an underlying bony surface, mobilizing the soft tissue by reducing adhesions (Cyriax 1975; Brosseau et al. 2002).

C. Traction

1. Know that manual stretching techniques improve the range of joint motion and the extensibility of soft tissues. Sustained progressive stretching is included in the stretch and spray technique to inactivate trigger points. This technique often is used in conjunction with spraying with a vapocoolant (Travell and Simons 1998; Hanten et al. 2000).
2. Know that traction is a mechanical distraction of tissues, done manually or mechanically. It is an adjunct to treatment of spinal problems. There is little evidence to support the use of mechanical traction as an outpatient treatment for simple low back and neck pain (Swenson 2003).

III. Exercise: Know the purpose of using exercises in the management of pain.

A. Know that immobilization can reduce strength and function of muscles, ligaments, and tendons. Prescribed exercises that increase the forces being transmitted to muscles, ligaments, tendons, and bones will maintain and gradually increase the strength and functional capacity of these structures (Mujika and Padilla 2001a).

B. Know that reduced physical activity reduces cardiovascular fitness (Mujika and Padilla 2001a) and that graded aerobic exercises increase cardiovascular fitness (Mujika and Padilla 2001a,b).

C. Be aware that aerobic exercises to increase cardiopulmonary capacity fitness and endurance include rhythmic, repetitive, dynamic activities such as brisk walking, running, cycling, and swimming. These activities involve large muscle groups and should be performed for at least 20 minutes three times weekly (Wittink and Hoskins 2002).

D. Stretching exercises should be done slowly, steadily, and sustained at the limit of range. Ballistic stretching exercises, involving bouncing and jerking, should not be used (Watson 2000).

E. Know that exercises include passive, active assisted, resistive, progressive resistive, and stretching exercises.

1. Passive movements can reduce pain and stiffness and improve range of motion (Chiarello et al. 1997).
2. General exercise programs are effective in reducing pain and disability for both subacute and chronic pain problems (Liddle et al. 2004).
3. Specific exercises can be used to target specific tissues and joints to maintain and increase muscle strength, increase range of motion, and promote general physiological conditioning (Watson 2000).

F. Understand that physical exercise can be used with other therapies such as manipulation and TENS.
G. Understand that the goals of therapeutic exercises include increased strength, endurance, range of motion, co-ordination and balance; reduction of pain, spasm, edema, and postural deviations; and the promotion of activities of daily living (Watson 2000).

H. Understand that goals for physical exercises should be agreed, maintained, and reviewed regularly. Gains in physical exercise targets must translate into targeted increases in physical activities of daily living and return to normal activity (including work), and goals should be set accordingly (Harding and Watson 2000).

I. Understand that fear of physical activity can limit participation in physical exercise and activity (Vlaeyen and Linton 2000). Participation in physical activity, when introduced appropriately, can reduce fear of exercise and perception of pain (Vlaeyen and Linton 2000; Vlaeyen et al. 2002).

J. Know that there is evidence that patients with herniated nucleus pulposus with low back and leg pain can benefit from a physical exercise program (Saal 1990).

K. Know that general exercise regimes involving stretching exercises and aerobic conditioning exercises can help patients with chronic pain of musculoskeletal origin by reducing pain report and self-reported disability (Harding et al. 1998; Mannion et al. 2001; Liddle et al. 2004).

L. Know that there is little evidence to support the use of specific exercises over general exercise in the management of low back pain (van Tulder et al. 2003).

M. Understand that routine general physical exercise programs improve mood (Brosse et al. 2002).

N. Be aware that patient compliance with physical exercise reduces after treatment ceases. Supervised exercise is likely to result in better compliance and maintenance of effect than unsupervised exercise (American College of Sports Medicine 2000; Liddle et al. 2004). Specific strategies are required to ensure that exercise is continued to promote a healthy lifestyle (Watson 2000).

REFERENCES


